

REMARKS

Careful consideration has been given to the Official Action of May 16, 2003 and reconsideration of the application as amended is respectfully requested.

The Examiner has rejected claims 1, 7-15, and 17 under 35 U.S.C. § 112, second paragraph. The same claims have also been rejected under 35 U.S.C. § 103 as being unpatentable over Legille et al (US 4,243,351) in view of Fukushima et al. (US 4,913,406), Contrucci et al. (US 6,391,086) and Wieczorek (US 3,799,368).

Claims 1-17 have been canceled thereby rendering previous rejections moot. New claims 18-31 have been added, and are clearly distinguished from the cited art as will be explained in detail hereafter.

The present invention is directed to a method and an apparatus for distributing charge into a furnace having a rectangular interior cross-section to form a vertical column of charge on opposite sides of a vertical column of fuel in order to maximize exchange of heat between ascending hot gas and the charge within the furnace. More specifically, the present invention provides for distribution of the charge to form a longitudinal central column of solid fuel and longitudinal, vertical columns of charge on opposite sides thereof as illustrated in Fig. 1.

As recited in new claim 18, the present invention comprises a fuel distributor for distributing a longitudinal central column of solid fuel and a charge distributor on opposite sides of the fuel distributor for distributing longitudinal, vertical columns of charge. Furthermore, each of the charge distributors includes a distributor tube journaled for movement in two planes perpendicular to each other, one longitudinally of the furnace, the other crosswise of the furnace.

In contrast, Legille et al. discloses a method and apparatus for charging a shaft furnace

such as a blast furnace with a rectangular cross-section with a chute 34 that is capable of distributing charge to all areas of the rectangular interior cross-section.

In a structure where only a single chute is provided, the chute must traverse the entire interior to distribute the charge sequentially. Charge distributed by a chute generally will pile up conically near its trajectory having a greater circumference near the bottom than the top; therefore, as it moves from one location to another to sequentially distribute charge, the bottom of the cones will protrude into areas where a different type of charge is desired. Hence, there is no suggestion of having a central column of solid fuel and distinct columns of charge on opposite sides thereof.

It should also be noted that Legille et al. provides only one intermediate storage connected to a hopper to feed the single chute. Legille et al. show no means for separate supply of solid fuel and metal in separate longitudinal columns and there is no contemplation to store different types of charge to be distributed to different areas of the furnace.

Fukushima et al. disclose a method of charging a circular cross-section shaft furnace with different ore/coke ratio mixture in a specific pattern. Specifically, Fukushima et al. disclose a method of operating a shaft furnace by charging a central portion of the furnace with 100% coke, and charging a circumferential portion with a charge having a different ore/coke ratio. This is accomplished by controlling the feed to a single distributor from separate hoppers storing different mixtures of ore and coke. However, Fukushima et al. suffer the same drawbacks as Legille et al. by providing only a single distributor. Thus, Fukushima et al. is clearly distinguished from the present invention for the same reasons discussed above.

Contrucci et al. disclose self-reducing agglomerates; this is no longer claimed.

Wieczorek discloses a loading system for a blast furnace of circular cross-section.

Wieczorek is similar to Legille as it discloses a rotary distribution means. However, instead of a single distributor which pivots in two directions as in Legille, Wieczorek shows a plurality of distributors and weir pipes which only rotate. The weir pipes are disposed in a side-by-side, staggered parallel relationship, and have receiving ends at the center of the furnace. Particularly, all rotary distributors and their weir pipes are located and rotatable about a central axis of the furnace. This in contrast with the present invention which provides a fuel distributor located at the center of the furnace and a charge distributor on opposite sides of the fuel distributor, the charge distributors comprising tubes journaled for movement about different axes. The tubes are not disposed in a side-by-side, staggered parallel relationship as in Wieczorek and are intended to produce longitudinal columns of charge on opposite sides of the central column of fuel in a rectangular cross-section furnace. Therefore, it does not follow that it would be obvious to pluralize the Legille et al. charging apparatus as taught by Wieczorek as alleged by the Examiner to arrive at the separate distribution means of the present invention.

Mitsuo (JP 59143009) of record is worthy of note as it discloses charging a furnace of circular cross-section with coarse grain raw materials into the central part of the furnace and fine grain raw materials into the peripheral wall part of the furnace to make the temperature at the top of the furnace high, and to decrease the thermal load in the furnace wall part and thereby extend the life of the refractory material used for the furnace wall. This is distinguishable from the purpose of the invention and the distribution means as claimed.

All of the art discussed above taken singly or in combination fails to meet the claims

which call for a solid fuel distributing solid fuel into a central region of the furnace to form a longitudinal, central column of solid fuel, and a charge distributor disposed on opposite sides of the fuel distributor, each journaled for movement in two planes perpendicular to one another, one longitudinally of the furnace, the other crosswise to the furnace, to form longitudinal columns of charge on opposite sides of the central column of solid fuel.

In view of the above action and comments, it is respectfully submitted that the claims in the application are now in condition for allowance and favorable reconsideration is earnestly solicited.

Respectfully submitted,

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